

What is Claimed is:

1. A pacemaker system characterized in that said system contains apnea detection means that can measure respiratory related parameters (detection parameters) including at least two parameters: frequency of apneas per unit time and an apnea duration time, to detect an apnea state of a patient during sleep based on said measurement results, and that if the measured values of said detection parameters through said apnea detection means increase not lower than preset and stored reference values for shifting to SAS pacing rate, a pacing rate can be changed for shifting into a SAS treating mode.
2. The pacemaker system according to claim 1, characterized in that said apnea detection means is a MV sensor.
3. The pacemaker system according to claim 1 or 2, characterized in that said system has a function (SAS feature) in which at a time when the reference values for shifting into the SAS treating pacing mode are confirmed, a current pacing rate can be automatically changed to the SAS treating pacing rate set for each individual patient thereby continuously shifting into the SAS treating pacing mode.
4. The pacemaker system according to claim 3, characterized in that said SAS feature has a function of automatically setting a SAS pacing time period, and said function can select ON or OFF mode.
5. The pacemaker system according to claim 4, characterized in that if the ON mode of said function of automatically setting the SAS pacing time period for said SAS feature is selected, SAS pacing is performed by automatically changing the pacing rate to the SAS pacing rate preset for each patient for a time period automatically set by the SAS feature; and if the OFF mode

of said function of automatically setting the SAS pacing time period for said SAS feature is selected, SAS pacing is continually performed by changing the pacing rate to the SAS pacing rate preset for each patient for a time period while SAs are being
5 detected by said apnea detection means and at a time when measured results of the detection parameters of said apnea detection means become not higher than the detection parameter values as the reference values for shifting to said SAS treating pacing rate, the pacing at said set SAS pacing rate is stopped and returned
10 to a normal basic pacing rate or a rest rate.

6. The pacemaker system according to claim 5, characterized in that immediately after the measured results of the detection parameters of said apnea detection means become not higher than
15 the detection parameter values as the reference values for shifting to said SAS treating pacing rate, the pacing rate is successively reduced back to a basic rate or a rest rate.

7. The pacemaker system according to claim 5, characterized in that at the time when the measured results of the detection parameters of said apnea detection means become not higher than
20 the detection parameter values as the reference values for shifting to said SAS treating pacing rate, the SAS treating is, in stead of immediately being reduced to a basic rate, continued
25 at the SAS pacing rate for a fixed time period and after the expiration of said fixed time period, the pacing rate is gradually reduced back to the basic rate or the rest rate.

8. The pacemaker system according to claim 5, characterized
30 in that said fixed time period is a SAS pacing time period automatically set upon shifting to the SAS pacing.

9. The pacemaker system according to claim 1, 2, 3, 4, 5, 6, 7, or 8, characterized in that said detection parameter values
35 as the reference values for shifting to said SAS treating pacing

rate are set based on detection parameter values indicating an apnea state adversely affecting the patient.

10. The pacemaker system according to claim 9, characterized
5 in that said apnea state adversely affecting the patient is an apnea state affecting complications in the patient.

11. The pacemaker system according to claim 1, 2, 3, 4, 5,
6, 7, 8, 9, or 10, characterized in that said system contains
10 a QT sensor and/or a sensor for identifying heart rate fluctuation patterns.

12. The pacemaker system according to claim 1, 2, 3, 4, 5,
6, 7, 8, 9, 10, or 11, characterized in that said system contains
15 sleep detection means for detecting the patient asleep by measuring the body motion of the patient.

13. The pacemaker system according to claim 12, characterized
in that said sleep detection means is an acceleration (ACC) sensor
20 of a body motion (Activity) sensor.

14. The pacemaker system according to claim 1, 2, 3, 4, 5,
6, 7, 8, 9, 10, 11, 12, or 13, characterized in that said system
contains storage means (a memory) which stores the fluctuation
25 history of the detection or sensing results of at least one of
said apnea detection means for measuring said detection
parameters, said acceleration (ACC) sensor or body motion
(Activity) sensor, said QT sensor, said sensor for identifying
heart rate fluctuation patterns, and said SAS feature.

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15. The pacemaker system according to claim 14, characterized
in that said system can securely determine whether the patient
is in a normal sleep state or in an apnea state by utilizing
the fluctuation history of a MV sensor as an apnea detection
35 means.

16. The pacemaker system according to claim 14 or 15,
characterized in that said system determines whether the patient
is in a normal sleep state or in an apnea state based on a period
5 and intensity of the patient's respiration in fluctuation of
measured values of the detection parameters of said apnea
detection means stored in said storage means (memory).

17. The pacemaker system according to claim 14, 15, or 16,
10 characterized in that said system can distinguish between an
obstructive sleep apnea (OSA) and a central sleep apnea (CSA)
based on the fluctuation history of the detection or sensing
results of the MV sensor as a sleep apnea detection means, stored
in said storage means (memory) and the fluctuation pattern of
15 said QT sensor and/or the fluctuation history of the detection
or sensing results of said sensor for identifying heart rate
fluctuation patterns.